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| Name: Kelsea Dyer  Date: 11/23/15 Lesson Title: Algebra Tiles  Grade Level: 6th  Length of Lesson (Minutes): 65 | | |
| **Standards** | | |
| CCSS.Math.Content.6.EE.3  Apply the properties of operations to generate equivalent expressions.  CCSS.Math.Content.6.EE.2b  Identify parts of an expression using mathematical terms(sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.  CCSS.Math.Content.6.EE.4  Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).  MP.1 Make sense of problems and persevere in solving them.  MP.2 Reason abstractly and quantitatively.  MP.3 Construct viable arguments and critique the reasoning of others.  MP.4 Model with Mathematics  MP.5 Use appropriate tools strategically.  MP.6 Attend to precision  MP.7 Look for and make use of structure.  MP.8 Look for and express regularity in repeated reasoning. | | |
| **Central Focus of Unit/Learning Segment** | | |
| Simplify like terms with Algebra Tiles:  The students will learn how to simplify like terms using the Algebra Tiles.  Topics for Unit:   1. How to use Algebra Tiles. 2. Solving equations using Algebra Tiles. 3. Combining like terms using Algebra Tiles. 4. Combining like terms without using Algebra Tiles. | | |
| **Essential Understandings** | | **Essential Questions** |
| * How to use Algebra Tiles * How to simplify like terms * Like Terms * Zero Pairs | | * How can you combine like terms with Algebra Tiles and without using Algebra Tiles? * What is a zero point? |
| **Lesson Objectives** | | |
| * I can identify parts of an expression. * I can combine like terms with and without algebra tiles. * Should be able to use Algebra Tiles. * Should be able to combine like terms using Algebra Tiles. * Should be able to combine like terms without using Algebra Tiles. * Should identify how to do a zero term | | |
| **Language Demands** | | |
| **Language Function & Key Learning Task**  ***Language Function:*** Model  ***Key Learning Task:*** Students will model how to combine like terms using Algebra Tiles and without the Algebra Tiles.  **Content/Academic Vocabulary**   * Algebra Tiles- known as mathematical manipulatives that allow students to better understand ways of algebraic thinking and the concepts of algebra. * Negative Numbers- a real number that is less than zero * Positive Numbers- a real number that is more than zero * Variable- a symbol for a number we don’t know yet * Exponents- says how many times to use that number in multiplication * Terms- separated by + or - signs   + Can be:     - a known #     - a variable     - product of a known # and a variable. * Like Terms- terms whose variables are the same * Unlike Terms- terms whose variables are not the same * Coefficient- a number use to multiply a variable. * Constant- a number on its own * Zero Pairs- when a negative number and a positive number cancel out. * Expression- A phrase that can be simplified and has no relation symbol such as an equal sign. * Equation- a number sentence that can be solved, includes equal sign, and reveals relationships.   **Discourse & Syntax**  Discourse   * Students will respond orally to give answers using academic vocabulary. * Students will respond to questions orally throughout the entire lesson. * Students will talk to their neighbor while trying to make their own problem. * Students will write answers on their white boards and hold it up for me to see. * Students will share the I can statement with their shoulder partner.   Syntax   * Students will be able to model expressions by using Algebra Tiles. * Students will demonstrate they understand how to model expressions with Algebra Tiles by making up their own problem. * Students will use higher order thinking about how to figure out an expression without using the Algebra Tiles. * Students will record their answers on their independent practice worksheet.   **Supports**   * Physical supports use to encourage discourse and syntax provided during the lesson include: independent practice worksheet, practice problems on their white boards, using the algebra tiles, and the notecards with practice problems. * The teacher will be modeling the correct use of Content/Academic Vocabulary and the language function throughout the lesson while also monitoring for correct student use of the words in their discussions. * During discussions, the teacher will be probing questions to help the students use the Content/Academic Vocabulary. * Students who are struggling with the new vocabulary will be paired with someone who understands it. | | |
| **Materials/Resources** | | |
| **Teacher**   * Classroom kit of Algebra Tiles * Worksheets with practice problems * Note Cards with practice problems * Whiteboard/ marker access * Document Camera Access * Independent Practice worksheet * Notecards for Exit Tickets | **Students**   * Set of Algebra Tiles * White board * Expo Marker * Pencil * Independent Practice Worksheet * Note Card for Exit Ticket. | |
| **References** | | |
| **Flipbook:**   * Kansas Association of Mathematics Teachers. (2011). Kindergarten Common Core State Standards Flipbook.   **Definition:**   * <http://www.spellingcity.com/view-spelling-list.html?listId=4651260> * <http://www.mathsisfun.com/algebra/like-terms.html> * <http://www.mathsisfun.com/definitions/constant.html>   **Practice Problems:**   * <http://www.mathopolis.com/questions/q.php?id=2051&site=1&ref=/algebra/like-terms.html&qs=2051_2052_5498_5499_5500_2053_2054_5520_5521_5522> | | |

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| **Adaptations to Meet Individual Needs** |
| High-Level Learners:   * Will be able to do the expert problem after their independent practice.   On-Level Learners:   * This lesson plan is written for on-level learners.   Struggling Learners:   * Will be able to do the practitioner problem after their independent practice.   English Language Learner:   * Will be able to get one on one help to understand the vocabulary.   Additional Tools to use:  Algebra Tiles: known as mathematical manipulatives that allow students to better understand ways of algebraic thinking and the concepts of algebra. |
| **Management/Safety Issues** |
| * Students will follow the classroom rules. * When playing with the algebra tiles, if they are misusing them they will have to do it without them. * When using the whiteboards, if they are doodling and playing instead of doing their work they will be asked to do it on paper instead. * When working in partners students will be monitored. |
| **Rationale/Theoretical Reasoning** |
| **Rationale**   * Students write expressions from verbal descriptions using letters and numbers. * Students understand order is important in writing subtraction and division problems. Students understand that the expression “5 times any number n” could be represented with 5n and that a number and letter written together means to multiply. * Students use appropriate mathematical language to write verbal expressions from algebraic expressions. Students can describe expressions such as 3 (2 + 6) as the product of two factors: 3 and (2 + 6). The quantity (2 + 6) is viewed as one factor consisting of two terms. * Students evaluate algebraic expressions, using order of operations as needed. Given an expression such as 3x + 2y, find the value of the expression when x is equal to 4 and y is equal to 2.4. * Students use the distributive property to write equivalent expressions. * When given an expression representing area, students need to find the factors. * Students use their understanding of multiplication to interpret 3 (2 + x). * Students interpret y as referring to one y. Thus, they can reason that one y plus one y plus one y must be 3y. They also the distributive property, the multiplicative identity property of 1, and the commutative property for multiplication to prove that y + y + y = 3y. * Students demonstrate an understanding of like terms as quantities being added or subtracted with the same variables and exponents. For example, 3x + 4x are like terms and can be combined as 7x. * Students connect their experiences with finding and identifying equivalent forms of whole numbers and can write expressions in various forms. Students generate equivalent expressions using the associative, commutative, and distributive properties. They can prove that the expressions are equivalent by simplifying each expression into the same form.   Kansas (2011)  **Theory**   * The purpose of teaching through a concrete-to-representational-to-abstract sequence of instruction is to ensure students truly have a thorough understanding of the math concepts/skills they are learning. When students are learning the terms for this lesson they will develop a concrete understanding of a math concept/skill by using the Algebra Tiles, then they are more likely to perform that math skill and truly understand math concepts at the abstract level by modeling it with the Algebra Tiles and writing the expression that correlates. * Students are provided an opportunity to socially construct knowledge while working with their peers. They also have the opportunity to work in their zone of proximal development. (Vygotsky, 1978).   **Common Misconceptions or Difficulties**   * Misconceptions when dealing with expressions stem from the misunderstanding/reading of the expression. For example, knowing the operations that are being referenced with notation like, x 3 , 4x, 3(x + 2y) is critical. The fact that x³ means 𝑥 ∙ 𝑥 ∙ 𝑥; x times x times x, not 3 times x; 4x means 4 times x or x+x+x+x. * When evaluating 4x when x = 7, substitution does not result in the expression meaning 47. * When using the distributive property, students will often multiply the first term, but forget to do the same to the second term. * Students assume if there is not a coefficient in front of a variable, there is not actually a number there. They do not see that y = 1y. * When solving equations and inequalities, they may use the inverse operation on only one side and on the other or they may use the same operation rather than the inverse.   Kansas (2011) |

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| **Assessment/Evaluation Criteria** |
| **Formative Assessment** (Learning Objectives 1,2,& 4)   * Fist to 5   + Students will be stopped after learning how to use algebra tiles to solve problems without combining like terms to make sure they understand. They will also be asked what they have learned so far. * Make your own problem using Algebra tiles.   + You can go from expression to tiles or tiles to expression.   + After you’ve made your own problem then switch with your shoulder partner and see if they can answer it. Use your white boards to write your starting expression or expression answer. * Thumbs up/ Thumbs down   + Students will be stopped again after using Algebra tiles to combine like terms and asked if they understand. They will be asked again what they have learned. Up- great. Middle- Iffy. Down- doesn’t get it at all.   **Summative Assessment** (Learning Objective 3)   * Independent Practice Worksheet   + This worksheet will have problems on it about combining like terms without using the algebra tiles. To master, students can only miss one. * Exit Ticket   + Their exit ticket will contain a practitioner and an expert problem that they can choose. For mastery, they have to get one of the problems right.     - Practitioner: 5x + 2 + 7x + 5 + 6x + 3     - Expert: 10x + 3 – 2x + 5 – 3x + 4   + It will also contain a “Think About It”     - What you would do if you had two variables in one problem. How would you solve one like 2x + 3 + 4y + 5x + 2y? You are going to learn that tomorrow so think about it tonight.   **Academic Feedback**  I will closely watch the students when we are doing practice problems and make sure they are getting the problems right. I will be listening for the right academic language and when they don’t use it, I will guide them to understand the academic language so they can use it on their own. I will encourage the students that are using the academic vocabulary and that are on task. While they are working with their partner, I will be walking around and making sure they are understanding how to make their own problem with the algebra tiles. When they turn in the “Independent Practice Problems” worksheet, I will write directly on it academic feedback and give it back to them before we start math the next day and discuss some of their misunderstandings because the next lesson builds on this lesson. |

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| **Instruction** | **Higher-Order Thinking Questions** |
| **Set/Hook/Motivator (Before)- (5 minutes)**   * **Quick Question** * “Ana’s age is 8 years less than 4 times her sister’s age. Write an expression for Ana’s age. How old is Ana if her sister is 5 years old?   + Allow the students time to work on the problem.   + Go over quick question and answer any questions the students may have. * **Go over the “I can” statement for the day.** | * What is the expression? How did you figure that out? * How do you find x? What is x? * How old is Ana? * Do we understand the “I can” statement? How do you think we are going to use this? |
| **Instructional Procedures (During) (59 minutes)**    **1.** **Introduce Vocabulary (10 minutes)**  I will put on the definitions on the board and the students will be required to write notes in their notebooks.   * Terms- can be separated by + or - signs. * Like Terms- terms whose variables are the same. * Unlike terms- terms whose variables are not the same. * Zero pair- when a negative and a positive cancel out. * Constant- a number on its own. * Coefficient- a number used to multiply a variable. * Variable- A symbol for a number we don’t know yet. * (Draw problem labeling the parts\_ 4x-7=5. 4 is the coefficient. X is the variable. 7 and 5 are the constants.)   **2.** **Introduce Algebra Tiles (3 minutes)**   * Put key on the board.      * Explain what each piece means.     **3.** **Algebra Tiles without combining zero pairs. (10 minutes)**   * Algebra Tiles WS #- 1,5,6,8,9 on document camera * Working with Algebra Tiles WS #3 on note card. * Modeling Polynomials With Algebra Tiles on note card #- a,b,c,d * Working with Algebra Tiles on overhead projector # 4-10 * Modeling Polynomials with Algebra Tiles WS on overhead projector # e-h   ***Formative Assessment: (2 minutes)***  Fist to 5  Fist- doesn’t understand at all. 5- Understand fully.  **4.** **Combining like terms with zero pairs (10 minutes)**   * Model problems with Algebra tiles (Tiles to expression) using document camera   + Algebra Tiles WS #- 2,3,4,7,10   + Working with Algebra Tiles # 1,2 * Do more examples on notecards. * “What is Wrong?” note card. * Model using algebra Tiles (Expression to Tiles)   + Do on notecards on the projector.   ***Formative Assessment: (5 minutes)***  Make your own problem using Algebra tiles.  You can go from expression to tiles or tiles to expression.  After you’ve made your own problem then switch with your shoulder partner and see if they can answer it. Use your white boards to write your starting expression or expression answer.  ***Formative Assessment: (2 min)***  Thumbs up/ Thumbs down  Up- great. Middle- Iffy. Down- doesn’t get it at all.  **5.** **Challenge! (10 minutes)**  Can we combine like terms without using Algebra Tiles?  o On white board do some example problems and have students answer them on their whiteboard.  o -2x + 5 + 4x – 2  o 5x + 3 – 3x + 6 + 2x  o 3x + 7 + 2x – 2 + 5x  o 10x -2 +5 -2x + 7  o 15x + 3 – 5x + 6 +5x – 2 + 10x  **6.** **Independent Practice WS (7 minutes)**  Summative Assessment  “Combining Like Terms” | * Which words do you recognize on the board? * What words can you define without my help? * Explain what a term is to me. Including like and unlike terms. * Have you ever used Algebra Tiles before? * What do you think we will be using them to do today? * How are we combining like terms? * How else do you think we could do this to make it a little more hard? * What have we learned so far? * Does everyone understand how to use algebra tiles to illustrate expressions? * Do you think it would be easier or harder to go from tiles to expression? * Do we understand how zero pairs work? * Who can define zero pairs to me one more time? * Do you think you can make your own problem using the Algebra Tiles? * Understand? * What have we learned now? * Could we think of a way it could be more challenging? * Can we combine like terms without using Algebra Tiles? * How is this the same as what we were just doing? * Could we think of ways this could get even harder? |
| **Closure (After)**  **7. Exit Ticket- Summative Assessment (3 min)**   * Practitioner/ Expert   + Practitioner:     - 5x + 2 + 7x + 5 + 6x + 3   + Expert:     - 10x + 3 – 2x + 5 – 3x + 4 * Think About It   + What you would do if you had two variables in one problem. How would you solve one like 2x + 3 + 4y + 5x + 2y? You are going to learn that tomorrow so think about it tonight.   If extra time remains, I will work some two variable problems out with them. | * Do you think you are a practitioner or an expert? * What would you do if you had two variables in one problem? * How would you solve it? |









